

Claims:

I claim:

- 1) An alkali-resistant material comprising:  
20 to 80 % by weight of MgO;  
10 to 50 % by weight of SiO<sub>2</sub>;  
5 to 30 % by weight Al<sub>2</sub>O<sub>3</sub>; and  
1 to 10 % by weight Fe<sub>2</sub>O<sub>3</sub>, CaO, and alkali oxides.
- 2) The alkali-resistant material of claim 1 wherein the dominant crystalline phases are forsterite and spinel.
- 3) The alkali-resistant material of claim 1 wherein the alkali oxide is K<sub>2</sub>O.
- 4) The alkali-resistant material of claim 1 wherein the alkali oxide is Na<sub>2</sub>O.
- 5) The alkali-resistant material of claim 1 wherein the MgO is derived from oxides of magnesium.
- 6) The alkali-resistant material of claim 1 wherein the MgO is derived from talc.
- 7) The alkali-resistant material of claim 1 wherein the SiO<sub>2</sub> is derived from clay.
- 8) The alkali-resistant material of claim 1 wherein the Al<sub>2</sub>O<sub>3</sub> is derived from clay.
- 9) A process for the production of an alkali-resistant ceramic body comprising the steps of:

- a) grinding together a mixture comprising 0% to 50% by weight of light magnesia, 0% to 85% by weight of roasted magnesia, 10% to 60% by weight of ceramic clay, 0% to 15% by weight of limestone, 0% to 3% by weight of water glass, 0% to 3% by weight of carboxymethyl cellulose, 0% to 30% by weight of talc, and 0% to 30% by weight of calcium or barium carbonate to a particle size of less than 50 microns for 80% of the particles;
- b) mixing the ground mixture with water to produce a paste containing less than 30% by weight of water;
- c) shaping the paste to a desired shape;
- d) drying the shaped product at a temperature greater than 100 degrees centigrade to make it suitable for firing in a kiln; and
- e) firing the dried shaped product in a kiln at 1,250 to 1,450 degrees centigrade.

10) A process for coating a conventional ceramic body with an alkali-resistant ceramic coating comprising the steps of:

- i) preparing an alkali resistant ceramic coating by grinding together 75% to 85% by weight of roasted magnesia, 5% to 10% by weight of ceramic clay, 0% to 15% by weight of limestone, 0% to 2% by weight of water glass, and 0.5% to 2% by weight of carboxymethyl cellulose to a particle size of less than 40 microns for 80% of the particles;
- ii) mixing the ground mixture with water to produce a paste containing less than 30% by weight of water;

iii) applying a coating of the alkali resistant material paste to the surface of the conventional ceramic body;

iv) drying the coated ceramic body at a temperature greater than 100 degrees centigrade; and

v) firing the dried coated ceramic body in a kiln at 1,200 to 1,400 degrees centigrade.

- 11) An alkali-resistant ceramic body comprising:  
20 to 80 % by weight of MgO;  
10 to 50 % by weight of SiO<sub>2</sub> ;  
5 to 30 % by weight Al<sub>2</sub>O<sub>3</sub>; and  
1 to 10 % by weight Fe<sub>2</sub>O<sub>3</sub>, CaO, and alkali oxides.
- 12) The alkali-resistant ceramic body of claim 11 wherein the dominant crystalline phases are forsterite and spinel.
- 13) The alkali-resistant ceramic body of claim 11 wherein the alkali oxide is K<sub>2</sub>O.
- 14) The alkali-resistant ceramic body of claim 11 wherein the alkali oxide is Na<sub>2</sub>O.
- 15) The alkali-resistant ceramic body of claim 11 wherein the MgO is derived from oxides of magnesium.
- 16) The alkali-resistant ceramic body of claim 11 wherein the MgO is derived from talc.
- 17) The alkali-resistant ceramic body of claim 11 wherein the SiO<sub>2</sub> is derived from clay.

- 18) The alkali-resistant ceramic body of claim 11 wherein the Al<sub>2</sub>O<sub>3</sub> is derived from clay.
- 19) The alkali-resistant ceramic body of claim 11 wherein the porosity is less than 5% by volume.
- 20) The alkali-resistant ceramic body of claim 11 wherein the water absorption is less than 5% by weight
- 21) The alkali-resistant ceramic body of claim 11 wherein the compressive strength of the ceramic material is greater than  $2 \times 10^8$  Newtons per square meter.
- 22) The alkali-resistant ceramic body of claim 11 wherein the loss in weight of the alkali-resistant ceramic body is less than one percent when exposed to molten potassium carbonate.
- 23) The alkali-resistant ceramic body of claim 11 wherein the gain in weight of the alkali-resistant ceramic body is less than one percent when exposed to wood ash at greater than 800 degrees centigrade.
- 24) A ceramic body coated with an alkali-resistant material, the alkali resistant coating comprising:  
20 to 80 % by weight of MgO;  
10 to 50 % by weight of SiO<sub>2</sub>;  
5 to 30 % by weight Al<sub>2</sub>O<sub>3</sub>;  
and 1 to 10 % by weight Fe<sub>2</sub>O<sub>3</sub>, CaO, and alkali oxides.

- 25) The ceramic body of claim 24 wherein the dominant crystalline phases of the alkali resistant coating are forsterite and spinel.
- 26) The ceramic body of claim 24 wherein the porosity of the alkali resistant coating is less than 5% by volume.
- 27) The ceramic body of claim 24 wherein the water absorption of the alkali resistant coating is less than 5% by weight.
- 28) The ceramic body of claim 24 wherein the alkali oxide is  $K_2O$ .
- 29) The ceramic body of claim 24 wherein the alkali oxide is  $Na_2O$ .
- 30) The alkali-resistant material of claim 24 wherein the  $MgO$  is derived from oxides of magnesium.
- 31) The alkali-resistant material of claim 24 wherein the  $MgO$  is derived from talc.
- 32) The alkali-resistant material of claim 24 wherein the  $SiO_2$  is derived from clay.
- 33) The alkali-resistant material of claim 24 wherein the  $Al_2O_3$  is derived from clay.